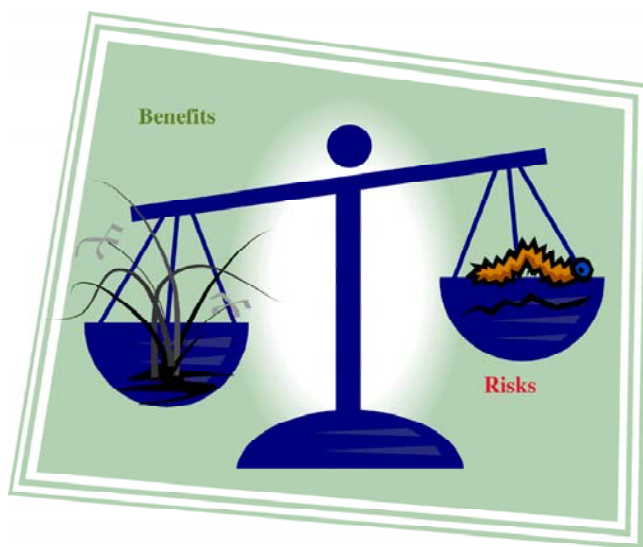


Agricultural Outlook Forum 2005.

## ***Science, Policy, Markets—What's Ahead?***

Crystal Gateway Marriott Hotel, Arlington, Virginia, 25 February 2005.



# ***Biological Control: A Sustainable Management Option for Invasive Species***

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# Goals

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- 1. To provide a conceptual model for biological control in a risk analysis context; and**
- 2. To develop a complex example of biological control using saltcedar, an invasive tree from Eurasia.**

## **Some Pest Management Strategies**

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- ➊ **Chemical: Insecticides, herbicides**
- ➋ **Mechanical: Weeders, machinery**
- ➌ **Cultural: Revegetation, timing**
- ➍ **Biological: Natural enemies**
- ➎ **Legal: Legislation**
- ➏ **IPM: Predictable combinations of strategies**

## What is Classical Biological Control?

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The use of **live** natural enemies of a pest to reduce permanently its **population** level to below an environmental or economic **threshold**.

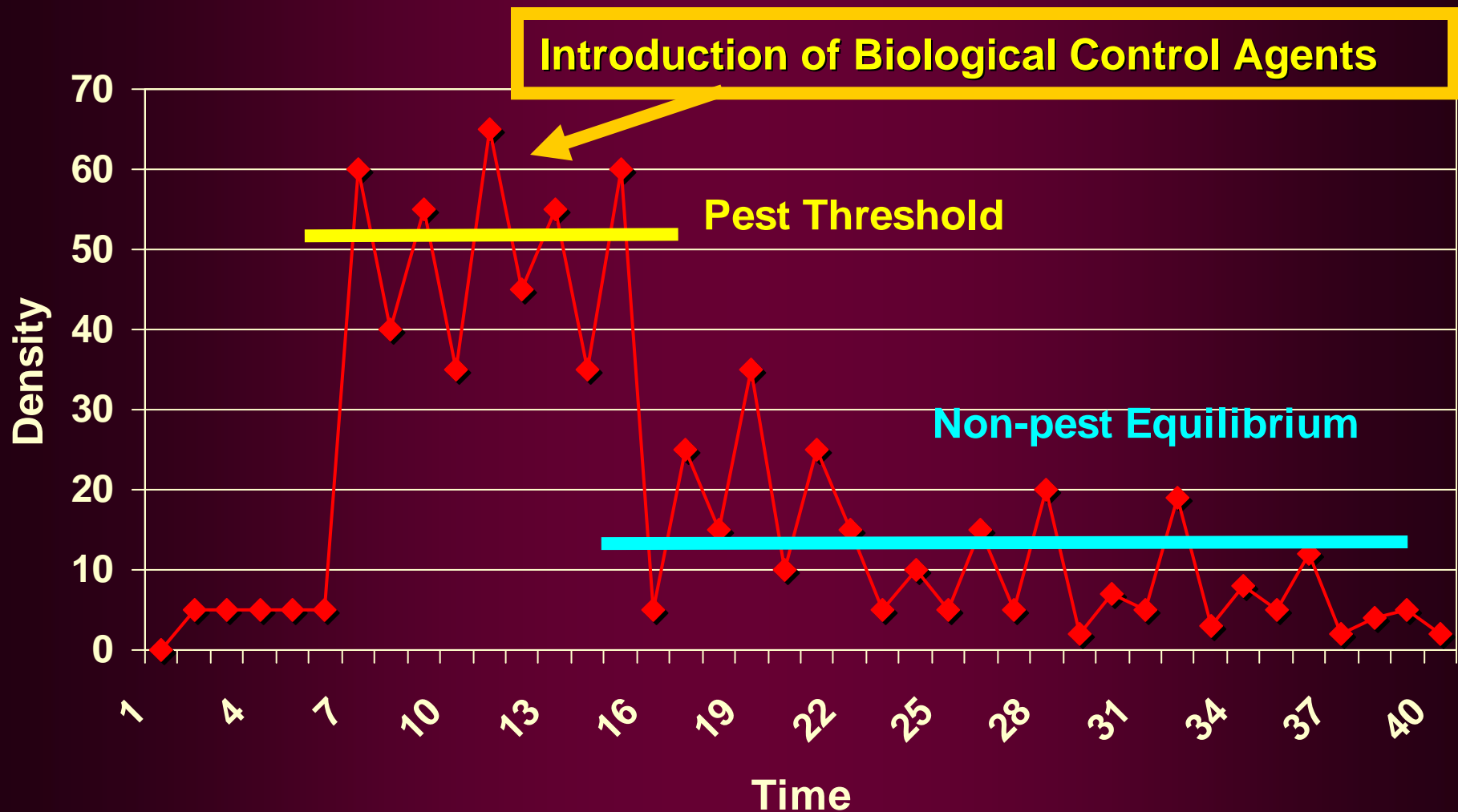
## **Steps In A Classical Biological Control Program**

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- **Initiation;**
- **Confirm identity and home range of target pest;**
- **Foreign exploration for natural enemies;**
- **Selection of high-priority natural enemies;**
- **Host-specificity testing;**
- **Importation and quarantine clearance;**
- **Release and evaluation/monitoring;**
- **Technology transfer; and**
- **Determination of success.**

# Theoretical Model of Biological Control

What is the “overall risk” to non-target species?



# Risk vs. Host Range

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**Monophagy**

**Oligophagy**

**Polyphagy**

**Risk to Non-Target Species**

**Availability in Nature**

# A Complex Example

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- ✚ **The most difficult challenge to biological control is predicting the risk in the field from a natural enemy that attacks, in host-specificity tests, a non-target species.**
- ✚ **Saltcedar, *Tamarix* spp., will be used as an example to illustrate the biological control process.**



# Cast of Characters

## ✿ Saltcedar



## ✿ *Diorhabda elongata*



## ✿ Southwestern Willow Flycatcher

# The *Saltcedar Biological Control Consortium* and Its Operational Committees.

**Project Co-Coordinator: Carruthers, DeLoach and Nibling**

## **Program Management/ Coordination**

- Implement ad-hoc recommendations
- Promote cooperation
- Prepare reports
- Organize and run meetings
- Provide administrative support
- Technology transfer assistance

## **Ad-hoc Management Committee**

- Representatives from several consortium groups.
- Limited to approx. 15 members
- Set program direction and review progress
- Assist in gaining project support.

## **Monitoring Committee**

- Insects
- Vegetation
- Wildlife
- Abiotic Factors

**Additional  
Committees  
as Needed**

**Revegetation  
Committee**

**Public Information  
Technology Transfer  
Committee**

**MOU, Research  
and Coordination  
Committee**

**Over 60 Federal, State and Private Organizations  
Participant Actively in the *Saltcedar Biological Control Consortium*!**



## Biological Control: A Sustainable Management Option for Invasive species

# Focus on Safety!

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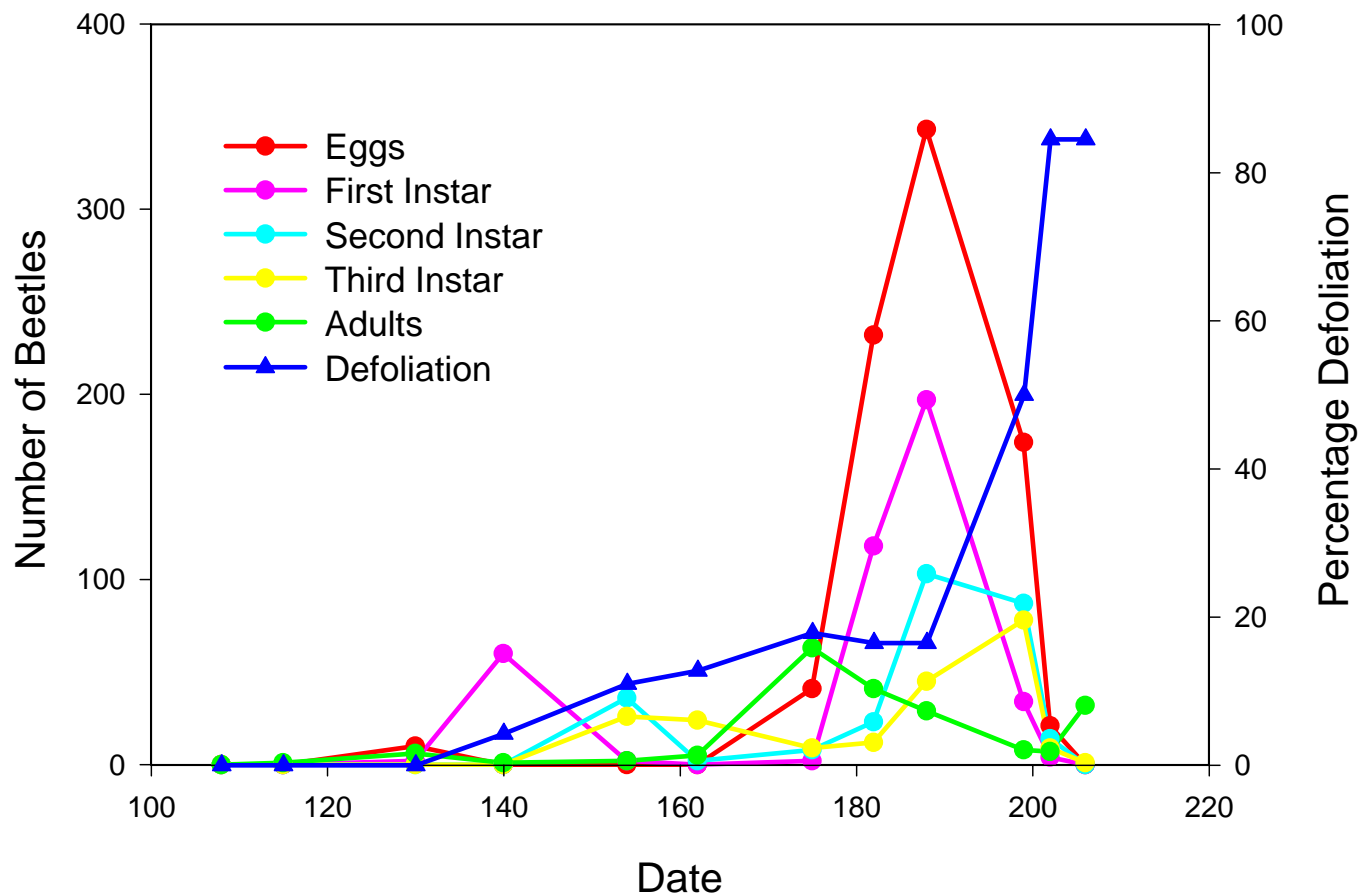
❖ Years of quarantine safety (host-specificity) testing ...

... followed by testing in field cages for several years before released in the wild.

## Biological Control: A Sustainable Management Option for Invasive species

# *Diorhabda* Population Increase

Research shows a 30x increase per generation!



**Only 1,300 *Diorhabda elongata* were released into the open field in summer of 2001.**



**Remember the 30x population increase per generation.**



# Summary and Conclusions

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- 1. Biological control, as the base strategy of integrated pest management, has been shown to safely control many weed and arthropod pests in the last 120 years;**
- 2. The key criterion for implementing a program is safety of the biological control agents, so host-specificity testing and post-release monitoring are key; and**
- 3. It is very important to have a diverse team of colleagues conducting the research and transferring the results to end users.**

**Questions?**